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DRAWINGS ATTACHED

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(54) ADJUSTABLE SLIDE BEARING FOR MOTOR GRADER BLADE SUPPORTS

(71) We, CATERPILLAR TRACTOR CO., a corporation organized and existing under the laws of the State of California, United States of America, of 100 N.E. Adams Street, Peoria, State of Illinois 61602, United States of America, formerly of 800 Davis Street, San Leandro, State of California, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to powered earthworking apparatus and more particularly to slide bearings for disposition between the side shift rails of a motor grader blade and the structure which couples the rails to the body of the motor grader.

In motor grader operations, productivity, job quality, and operating costs may each be adversely affected by imprecision in controlling the position of the blade. A factor which strongly influences grading precision is the amount of free play or looseness in the structure which attaches the blade to the body of the vehicle. Undesirable free play may result from the design of the blade supporting structure or from the wearing of elements which originally provided for fairly precise blade control. One area which is particularly troublesome in this respect is the coupling to the slide rails at the back of the blade.

Most motor graders have a draw bar carrying a rotatable blade circle at the underside of the frame, and the blade is supported through a pair of arms which extend downward from the blade circle. Brackets at the lower end of the arms engage the slide rails which extend along the back of the blade. Since means are usually provided for shifting the blade, in a direction parallel to the blade circle, a sliding coupling between the brackets and the rails is required. Because of the extremely large loading forces to which the blade may be subjected, wearing at this coupling occurs very rapidly and may be very pronounced.

Where the slide rails are of rectangular cross section, the mounting brackets are generally U-shaped to clasp the rails and a similarly shaped wearplate or slide bearing is disposed therebetween. As wearing occurs, it has heretofore been the practice to introduce shims from time to time to compensate for the increasing free play. However, access to the structure for the insertion of shims is inherently difficult, and the operation is tedious and time consuming.

This invention is a slide bearing for disposition between the blade rails and the blade supporting structure of a motor grader, the bearing being readily adjustable to compensate for wear so that a high degree of precision in blade positioning may be maintained. The bearing is formed by at least two separate members disposed against the associated rail within a bracket of the blade supporting structure and by adjustable means which bear against the members to determine the clearances between the members and the rail. In a preferred form, the component members of the bearing are right angled and one has a projection which extends into a matching recessed area of the other so that the two members are interleaved and jointly define a U-shaped bearing conforming to a rectangular rail.

Accordingly, it is an object of this invention to improve grading precision and to reduce the difficulty of maintenance operations in motor grader operations.

It is a further object of the invention to provide a slide rail bearing for the coupling between the blade and blade supporting structure of a motor grader which is

[*Price 5s. 0d. (25p)*]

more readily adjustable to maintain preferred clearances.

The invention, together with further objects and advantages thereof, will best be understood by reference to the following description of a preferred embodiment and by reference to the accompanying drawings.

In the accompanying drawings:

Figure 1 is a perspective view of the blade of a motor grader and showing the blade rails and blade supporting structure associated therewith;

Figure 2 is a cross section taken along lines II-II of Figure 1 and showing the slide bearings of the present invention disposed between the blade rails and supporting structure; and

Figure 3 is an exploded perspective view of certain elements of the slide bearing of Figures 1 and 2 further clarifying the structure thereof.

Referring now to the drawing and more particularly to Figure 1 thereof, the blade 11 of a motor grader is normally supported by attachment to a blade circle 12 which has a pair of arms 13 that extend downward behind the blade. Suitable constructions for a blade circle 12 and structure for attaching the blade circle to the other components of the motor grader are well understood within the art.

Provision is usually made for side shifting or moving the blade 11 in a direction parallel to the plane of the blade circle 12 in a selective manner; and for this purpose, rails 14 extend along the back of the blade and are secured thereto. While slide rails are often welded to the back of a blade, imprecision can result in that distortions may occur as a result of the heating. In addition, the replacement of worn rails is very difficult. To avoid these problems, this example of the invention utilizes an advantageous replaceable rail construction. In this construction, four rails 14 are used each being substantially shorter than the blade 11 with a first set of upper and lower rails 14 and 14', respectively, being disposed along a first half of the blade and a similar set of upper and lower rails being situated along the other half of the blade. Four mounting brackets 16 secure the rails to the blade with one bracket being disposed at each end of each set of upper and lower rails 14 and 14'. Each bracket 16 has two apertures 17 which receive the ends of the associated rails 14 and 14' so that the rails are secured to the back of the blade in spaced relationship therefrom. In this example, the rails 14 and the apertures 17 of mounting brackets 16 are of square configuration.

Referring now to Figure 2 in conjunction with Figure 1, a bracket assembly 18 at the lower end of each blade circle arm 13 engages the two sets of upper and lower rails 14 and 14' to support and position the blade 11. Each bracket assembly 18 has an arm 19 pivoted at the base to the lower end of the associated blade circle arm 13 at a shaft 21, so that the bracket assembly and blade 11 may be turned forwardly and rearwardly about shaft 21 to adjust the pitch of the blade relative to the blade circle. To fix the blade 11 at a selected degree of pitch, a slotted projection 22 extends rearwardly from the upper end of arm 19 and a bolt 23 is transpierced through the slot 24 and engaged in the blade circle arm 13. Thus, by tightening bolt 23, the upper end of bracket assembly arm 19 is clamped relative to the blade circle arm 13.

To provide powered means for selectively side shifting the blade 11, a double acting hydraulic jack 26 extends parallel to the blade between the two bracket assemblies 18. The barrel 27 of the jack 26 extends a short distance through an opening 28 at the central portion of each bracket assembly arm 19 and is secured therein, the extensible rod 29 of the jack being coupled to one of the end rail mounting brackets 16.

Considering now the coupling between rails 14 and bracket assembly 18, an inverted U-shaped bracket 31 is secured to the upper end of each bracket assembly arm 19 to form a passage 30 through which the upper rail 14 extends and a similar but reversed bracket 31' is secured to the lower end of the arm at the corresponding lower rail 14'. The dimensions of the passage 30 of bracket 31 are greater than the cross sectional dimensions of the rail 14 to provide for the disposition of two bearing members 32 and 33 between each bracket and rail. The bearing members 32 and 33 at each bracket 31 jointly form a structure of U-shaped cross section generally conforming to the rail 14 and the bracket. However, unlike the brackets 31, the bearing defined by members 32 and 33 is compressible both vertically and horizontally to provide for adjusting clearances and to compensate for wear.

Referring now to Figures 2 and 3 in conjunction, each bearing member 32 associated with one of the upper rails 14 is right angled to form a first flat section 34 fitting against the rearward side of rail 14 and a second flat section 36 fitting against the upper surface of the rail. The central portion of the second section 36 has a rectangular slot 37 to receive a conforming projection 38 of the second bearing member 33. The second bearing member 33 has a flat rectangular section 39 fitting against

the forward surface of the upper rail 14, and the projection 38 which extends into the slot 37 of member 32 is disposed at right angles to section 39 at the central portion of the upper edge thereof. Thus, when the two bearing members 32 and 33 are assembled with section 36 and projection 38 interleaved, a wearplate is formed which contacts three sides of the upper rail 14. Further, the bearing members 32 and 33 are movable relative to each other in a fore and aft direction and also in a vertical direction to provide for adjustment.

Adjustment of the fore and aft clearance between the rail 14 and bearing members 32 and 33 is very readily effected by means of a pair of horizontally directed screws 41 engaged in the rear arm of the associated bracket 31 and bearing against the rear surface section 34 of bearing member 32 at spaced apart areas thereof. To adjust vertical clearances, a single vertically directed screw 42 is engaged in the central portion of bracket 31 to bear against the center of the upper surface of projection 38 of bracket member 33. To aid in holding a selected adjustment, both screws 41 and 42 may be provided with lock nuts 43.

The lower bearing members 32 and 33 are of similar construction but are reversed in position both vertically and in the fore and aft sense, as shown in Figure 2 in particular. Thus, bearing member 32 is adjacent the forward and bottom surfaces of the lower rail 14′ while bearing member 33 fits against the back thereof and against the bottom surface. The horizontal adjusting screws 41′ are engaged in the forward leg of the lower bracket 31′ and no vertical adjustment screw is needed inasmuch as vertical clearance at both brackets may be fixed by adjustment of the upper screw 42.

Referring now again to Figure 1, the bearings are retained within the upper and lower brackets 31 and 31′ by U-shaped end plates 44 which are secured to each end of each bracket by bolts 46.

While the invention has been disclosed with respect to a specific embodiment, it will be apparent that many modifications may be made; and it is not intended to limit the invention except as defined in the following claims.

WHAT WE CLAIM IS:—

1. A bearing construction supporting the blade of a motor grader in a slideable manner through a side shifting rail secured to said blade, comprising: a side shifting rail, a bracket carried by said motor grader and having a passage for receiving said rail; characterized by first and second bearing members disposed between said bracket and said rail in said passage, said bearing members being moveable relative to each other in a direction normal to said rail; and means for adjusting the position of at least one of said bearing members relative to the other in said direction normal to said rail.

2. A motor grader having the bearing construction defined in Claim 1 wherein said means for adjusting the position of said bearing members acts in a substantially fore and aft direction with respect to said motor grader.

3. A motor grader having the bearing construction defined in Claim 1 wherein said means for adjusting said bearing members has a first element acting in a fore and aft direction with respect to said motor grader and has a second independently adjustable element acting in a substantially vertical direction.

4. The bearing construction defined in Claim 1 wherein said first bearing member has a slot therein receiving a projecting section of said second bearing member whereby said first and second bearing members have interleaved sections which are slidable relative to each other in said direction normal to said rail.

5. The bearing construction defined in Claim 1 wherein said rail is of rectangular cross section and wherein said bearing members are right angled and have interleaved portions adjacent a single surface of said rail.

6. The bearing construction defined in Claim 5 wherein said first beairng member has a slot at a central region adjacent said surface of said rail and wherein said second bearing member has a projection entering said slot of said first bearing member, said slot and said projection being of matching rectangular configuration, and wherein said adjustment means comprises a first screw directed towards said projection and further comprises a pair of second screws directed against said first bearing member and spaced on opposite sides of said slot thereof, said second screws being normal to said first screw.

7. Slide bearing structure for a motor grader blade comprising a pair of vertically spaced upper and lower rectangular slide rails, an upper and lower bracket carried by said motor grader, each having a rectangular passage through which a separate one of said rails extends; an upper and a lower bearing disposed between said upper and lower rails respectively and the associated one of said brackets, each bearing comprising first and second right angled bearing members disposed against the forward and rearward surfaces of the associated rail and having interleaved por-

tions disposed against a third surface of said associated rail, said third surface being the upper surface of the upper rail and the lower surface of the lower rail; means for adjusting the spacing of said first and second members of each bearing in a direction transverse to said rail; and means for adjusting the vertical spacing of one of said bearings relative to the other thereof.

8. The slide bearing structure defined in Claim 7 wherein both the fore and aft and vertical orientation of said members of said lower bearing is reversed relative to that of said members of said upper bearing.

9. The slide bearing structure defined in Claim 7 wherein said vertical adjusting means is a screw engaged in said upper bracket and bearing against said interleaved portions of said upper bearing members.

10. A bearing construction substantially as hereinbefore described having reference to the accompanying drawings.

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1 SHEET

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale.

Fig. 1.

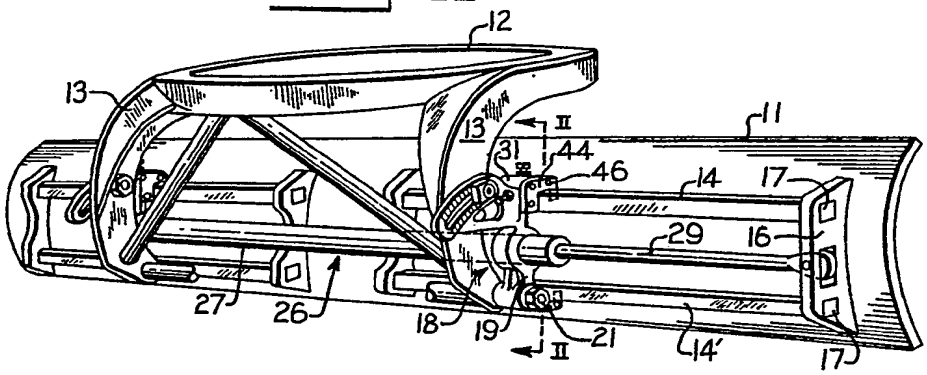

Fig. 2.

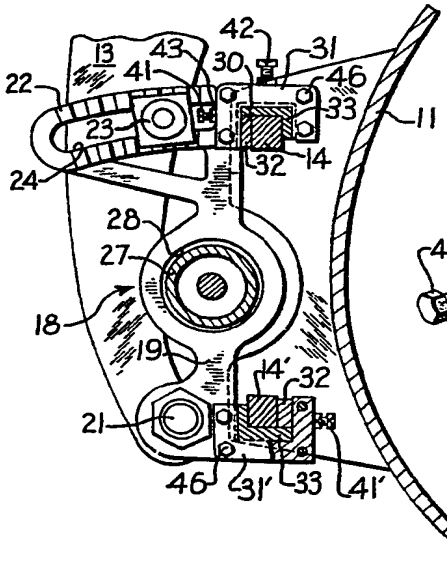

Fig. 3.